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COUNTRY Yugoslavia.

SUBJECT The Ikarus Aircraft Factory

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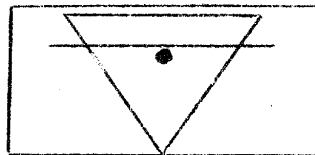
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1. The Ikarus Aircraft Factory is located northwest of Belgrade on the Belgrade-Zemun railroad approximately 60 meters from the Zemun fueling station. To the west of the factory at a distance of from 1,500 to 2,000 meters is the Zemun airport. The distance to the Zemun suburbs is 350 meters. The factory and its installations occupy an area approximately 360 meters long and 150 meters wide. The area is surrounded on the east and west by a wall 2.2 meters high, and on the south and east by a barbed wire fence on cement pillars 2.5 meters high.
2. The Ikarus factory was opened in 1946, after it had been renovated and repaired. During 1946 the factory worked exclusively on revisions and repairs to aircraft, and by the end of the year renovation work was completed on five "SOF" twin-engine transport gliders; 25 YAK-3 planes; five YAK planes which are similar to the YAK-3 but have two seats and a closed cabin and 20 IL-2 planes.
3. Construction of the AERO-2D models was begun in the early part of 1947. Plans for this plane were drawn by Boris Cijan and a certain Petkovic, both Yugoslav engineers. By the end of 1947, 30 planes were finished, and by 1950 a total of 120 "AERO-2D" planes were completed. Approximately 35 to 45 of these planes are in hangars awaiting engines. After the Cominform resolution, Czechoslovakia refused to deliver the Walter 120 horsepower engines which Yugoslavia had ordered. In 1949 negotiations were initiated with Great Britain for the purchase of Gypsy model engines which have not been delivered. The production plan for the AERO-2D has been fulfilled except for these planes.
4. Production of "S-49 A" planes was begun in the latter part of 1947. The first 30 planes were completed in May 1950. In 1948, 200 metal fuselages of the "IL-2" model were manufactured to substitute for Soviet manufactured fuselages. Production of landing gear (flaps), similar to the Stojan Stanisljevic model, was begun in 1949 for the Utva factory which was manufacturing 212 model planes. At the same time 25 AERO-2F planes, known as "mosquitoes" and used for spraying fields, were manufactured. In the period between 1946 and 1950 the following items were also produced:

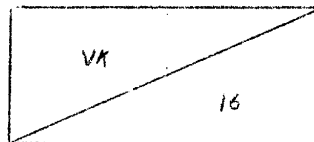
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- a. One ATO-2H seaplane, spare parts such as cold water tanks and other small parts in addition to the fuselage, wings and engines for Il-2 and YAK-3 planes. Approximately five series of ten complete sets were made.
 - b. One Trojka plane, now being mass produced in the UTVA factory at Pancevo, because the Trojka showed better results in the air than the "1 May".
 - c. Ten percent of the parts for the entire series (60 units or pieces) of C-49-C has been completed but the planes have not been assembled yet.
5. An article placed on order with the factory passes through the following phases before completion. The first phase is the planning section, where documentation is gathered and blueprints compiled. Documentation generally includes the lists of parts to be made and materials to be used. Entry and specification (expressed in four digit numbers) of the order is made in the planning section and then forwarded to the technological section, which has two branches. One branch calculates the time required for production, and the other is engaged in tool construction. A file system for each part of the item ordered is set up by technologists in cooperation with the tool makers. The order of production and tools to be employed are indicated in the files. Cards in the file are known as working orders. These orders are passed on to the norms branch where the time required for the preparation and completion of a specific job is entered. The complete card file, which is arranged according to subject, is turned over to the pre-calculation branch, where working norms are established. The card file then goes to the operations and plans section and the job is begun in the workshop, where the time required and amounts to be produced are written on the cards. From the workshop, the cards go to the material branch with drawings which show the requirements of raw material or finished parts. The working orders are forwarded to the production chief, who distributes the work to the supervisors of the workshops.
 6. Upon completion, the various parts are forwarded to the factory control section for inspection. There are two categories of unacceptable parts, those which cannot be used, and those which can be reworked. Completely unacceptable parts are stamped "rejected" and parts which can be reworked are sent back to the workshop to be handled by the worker who made them. Upon completion, they are returned to the control section where they are stamped as acceptable. The following is a sketch of the factory control stamp:



7. In this manner the working order is considered to have been fulfilled, since the amount of good and poor pieces is indicated in the last column. The products are then turned over to military control, where a stamp which bears the letters VK and the number of the controller is placed on the pieces. The following is a sketch of the military control stamp:



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As soon as the parts have been received by the military control, the working order is cancelled and returned to the norms branch where the production working hours are calculated and fulfillment of the norm is checked. If all is in order, all working orders are turned over to the operations and plans branch which registers the fulfillment of the working order, and submits a report to the fiscal section for payment to the workers. In each workshop, a record is kept of the number and names of workers, the operations, working groups, and dates showing the beginning and end of each job. This working list accompanies the working order and, with it serves as a basis for payment of the workers.

8. Each phase of production goes through the same process and is based on working orders. When each order has been fulfilled, the product is considered to be complete. Consequently, when all the working orders required for the production of a plane are completed, the plane is ready for a test flight.

9. The Ikarus factory employs 2,000 permanent workers. Personnel in the Ship-building Directorate are listed as follows:

Director	: A certain Lt. Colonel Bosanac (appointed in August 1950)
Political Representative	: A certain Lt. Colonel Petrovic
Secretary for Factory Party Committee	: Ilija Radek, locksmith
Chief Engineer	: Major Nebojsa Zivanovic, Communist Party member.
Chief Executive Officer	: Engineer Brakus, former owner of the Mikron factory. He worked as a prisoner in the UTVA factory, but was freed and appointed to the Ikarus factory.
Planning Director	: Lt. Srecko Padovan, Communist Party member
Chief Technician	: Engineer Rosta Telesov, a Russian and non-party member.
Chief of Production	: A certain Vujicic, Communist Party member.
Chief of Construction Bureau	: Aleksandar Ziranski, engineer (technician), non-party member.
Chief of Bookkeeping	: Danko Divic, Communist Party member.
Executive Officer for Personnel Representative	: A certain Lt. Tavcar, Communist Party member.
Chief of Machine Workshop	: A certain Mladen Vasic, Communist Party member.
Chief of Tinsmith Shop	: Blazo Drobnik, a non-party member.
Chief of Carpentry Shop	: A certain Djurica, Communist Party member.
Chief of Tool Shop	: Zilka Joksimovic, Communist Party member.
Chief of Locksmith Shop	: Mirko Micic, Communist Party member.
Chief of Assembly Shop	: Nikola Kupresanin, Communist Party member.
Chief of Electric Power and Building Maintenance	: A certain Capt. Bojanic, Communist Party member.
Chief of Smithy	: A certain Boza, Communist Party member.
Chief of Foundry	: Andrija Andacic, Communist Party member, who returned from Australia; former member of Australian Communist Party.

Chief of Auxiliary Sections : A certain Major Roko, Communist Party member.

10. The military control in the Ikarus factory is made up of officers of the Yugoslav Military Air Force. It has one chief and from four to five committee members. Military control chief is Capt. Spaso Jankovic, Communist Party member and former carpenter. One of the committee members is Capt. Mirko Rablenovic, who is Jankovic's assistant. The functions of military control include testing of the engines, structure and assembly of the planes. Each part is stamped with their stamp as authorization for use. Factory control generally has the same function as that executed by the military control but in the name of the factory, while the military control is the agent of the Yugoslav Military Air Force. Chief of factory control is Cole Matic, a technician and non-party member.
11. Characteristics and description of the individual types of planes constructed in the Ikarus factory area follows:
 - AIRO-2D - Training plane, with a speed of 200 kilometers per hour. Wing span is 10 meters; length is 9 meters. The landing gear is not retractable. It is powered by a 120 horsepower Walter engine and has one gas tank with a capacity of 80 to 100 liters. To date only one plane has been constructed with the British Gypsy engine. A few AIRO-2D's
 - S-49 A - were produced in Yugoslavia before the war.

Pursuit plane with a speed of 400 kilometers per hour. The wing span is a proximately 11 meters, and the length of the fuselage is 9.5 to 10 meters. The wings are made of wood, and the fuselage is fabric-covered steel tubes. Fins are made of wood and the movable parts of the tail assembly are metal. The landing gear is retractable. Armament consists of one cannon operating through the propeller shaft and two machine guns installed on the fuselage on both sides of the engine. Each machine gun has one ammunition box and the cannon has two spare drums. This plane reportedly has a high rate of climb. Twelve hundred horsepower Soviet engines, similar to those on the YAI plane, were used in the first 30 planes.
12. Differences between the S-49 A and the S-49 C, which soon will be mass produced, includes:
 - a. The S-49 C engine is a Hispano Suiza model but it has the same power rating as the S-49 A.
 - b. The S-49 C is completely metal covered.
 - c. The landing gear of the S-49 A was manufactured in the Italian factory Nardi, but that of the S-49 C will be manufactured in Yugoslavia. Plans were drawn by Stojan Stanisavljevic, and the landing gear is similar to that on the S-49 A.
 - d. The S-49 A has three gasoline tanks, one in front of the pilot with a capacity of 120 liters, and other two, each with a capacity of 80 liters, on the leading edges of the wings which gives the plane a total flying time of about three hours. The S-49 C will have a tank in front of the pilot, but will have four other tanks, two under each wing. This is similar to the YAK-3 which has two gasoline tanks in each wing connected by pipes. Only on the YAK-3 are the tanks between the wing bases, while on the S-49 C they will be located on the front edges of the wings.
13. The Pioneer plane has the pilot seated in a reclining position. The plan was drawn by Major Dragoljub Beslin. Only one wooden plane of this model has been made. Construction was begun in 1949 and completed in 1950. The plane has been sitting at the Zemun airport for six months, and is continuously undergoing tests. It has a wing span of 4.5 to 5 meters, and the height is 1.20 to 1.30 meters. It is equipped with two small engines with a two blade propeller. The diameter of the propeller is 1.20 meters. The engines are installed on the wings and the strength of each engine is from 60 to 80 horsepower. Landing gear is retractable. The wheels are located in the

gondola of the motor and fold back so that $\frac{1}{4}$ of the landing gear protrudes. If the landing gear should fail, the plane will fall on the rubber wheels which protrude from the fuselage, thus landing without harm to the latter. This is one of its best characteristics. One of its greatest drawbacks, on the other hand, is that the pilot is seated in an uncomfortable reclining position. The plane is not armed. (It is very possible that Beslin will improve the plane, and perhaps even arm it). Speed is 360 kilometers per hour. The Pioneer is not mass-produced. It is alleged that tests conducted on the plane by Beslin are for reasons of water propulsion, in which he is at present most interested.¹ Beslin's assistant on this aspect is Engineer Mario Stambuk.

14. A pilotless plane has been constructed in the Ikarus factory. The plan was drawn by Engineer Vukelic. The plane is somewhat larger than the Pioneer, but does not have a pilot seat. It is controlled from the ground (sic). Used only for testing, it was begun in 1949 and completed in the early part of 1950. The plane is referred to in the factory as the Vukelic plane.
15. A large passenger plane has been constructed in the Ikarus factory. The plan for it was drawn by professor Engineer Dusan Stankov and professor Engineer Sime Milutinovic. The plane can be easily converted into a heavy bomber. To date, only the one plane, completed in June 1950, has been turned out. The wing span is approximately 16 meters and the length of the plane from 12 to 13 meters. It has two motors and three cowls. The two motors are housed on the wings on either side of the plastic cabin. The fuselage is unusually large. Landing gear is retractable. The plane was not flight tested until October 1950.
16. The following regulations were sent to all section chiefs of the Ikarus Factory in February 1950 by the personnel representative, Captain Tavcar, with a request that a personnel characteristics file be made on each worker and submitted to the personnel section. The latter section would add other information and observations and the files would then be forwarded to the General Directorate in Belgrade. Classified strictly confidential, only chiefs of the labor union and the Party factory representative were allowed to have knowledge of the order:

"With a view to collecting the necessary information, improving organizational structure, and achieving better results in getting better acquainted with the workers, we are submitting to you the following instructions concerning the correct procedure for the compilation of information on work performed by the employees in this enterprise. It is not necessary to adhere to these instructions to the letter, but to use them as a measure which will assist in the coverage of the most characteristic traits of each individual worker. The information should be entered on time, and emphasis must be placed on the things which are important for the development and quality of each worker in question. The following should be borne in mind when making entries:

- a. "Classification entry of accomplishments achieved; to what extent a worker has succeeded in being an expert in his work, and how he performs his daily tasks.
- b. "Care and regard given by the worker to government property, and particularly to machinery and other installations. Whether he uses the equipment sensibly, with economy regarding his own work and that of his subordinates.
- c. "Relations of individual workers toward their superiors and subordinates, and interest concerning the latter's advancement, improvement and disciplinary attitudes.
- d. "Grading of work, interest and application should be founded upon working achievements of the workers, and advancement in their section, branch or office.
- e. "Character traits, moral political qualities - modesty, unselfishness, honesty, self-criticism, personal life, financial conditions, et cetera, must be listed, which consequently means all factors which are desirable in a government employee working for the Yugoslav Army.

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- f. "Grading of a worker's interest in doing voluntary jobs for the labor union, Front activity and youth group.
- g. "Grading of a worker's interest in personal political and ideological improvement, his political activity, his attitude toward the present regime and the building of socialism in Yugoslavia.
- h. "When making an entry of this information, the good qualities of a worker must not be emphasized only nor should the bad qualities alone be emphasized.

"We again wish to bring to your attention that the various traits must not be sketchy, and that the greatest possible attention must be given to this work, so that correct data may be had on each worker, since the practice of fair politics toward the staff of this enterprise depends greatly upon this."

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- 1. Comment: No other reports of such tests being conducted have been received. 25X1A

25X1A Comment: Your attention is called to [redacted] and [redacted] for previous reports on the Ikarus Factory.

25X1A Comment: A sketch showing the location of the Ikarus Factory and its various departments and offices is available in the CIA Library.

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- 1) Gate - (guards of the factory militia)
- 2) Room for factory on-duty officer
- 3) Administrative building - in which the following are located (clockwise):

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First floor:

- a) Construction bureau
- b) Offices of Chief Engineer
- c) Tracing Room
- d) Planning section
- e) Rooms for the factory committee of the Communist Party
- f) Personnel section (3 rooms)

Second floor:

- a) Supply section
- b) Commercial director
- c) Bookkeeping
- d) Treasury
- e) UDB
- f) Director's offices
- g) Secretariat

- 4) Constructions bureau VTI
 - a) Military control
 - b) Construction group for "S-49" planes
 - c) Office of Construction Bureau Director
- 5) Factory Fire Command
- 6) Workshop for welding of electric motors
- 7) Workshop for dismantling and assembly of electric motors
- 8) Warehouse containing various equipment for maintenance of factory buildings
- 9) Projecting roof
- 10) Shed containing old archives
- 11) Main warehouse for raw materials
- 12) Receiving warehouse
- 13) Section for testing of materials
- 14) Telephone plant
- 15) Telephone exchange

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- 16) Mess

- 17) Clinic

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18) Workers Union Branch

19) Kitchen

20) Food stores

21) Transformer station

22) Anodizing and Cadmiumizing (processes of artificial protection against rust;
the first one for duraluminum, and the other for steel)

23) Nickel-plating

24) Smithy

25) First floor: workshop for practical training of industrial apprentices

Second floor: also workshop for practical training of apprentices

26) Central fuel station

27) Office of chief electrician, next to which is a large chimney (35 to 40 meters
with a diameter of
2 meters)

28) Electric workshop

29) Workshop for wooden propellers

30) Workshop for maintenance of machinery

31) Machine workshop

32) Radio - public speaking system

33) Offices for registration of work done in machine shop

34) Office for chief of workshop

35) Preparatory warehouse for machine shop

36) Warehouse for parts brought into the factory (from abroad or from domestic
factories). These are parts specially intended for the airforce industry,
such as landing gear, cables (wires), light bulbs, screws, et cetera.

37) Factory control

38) Military control

39) Office for chief of factory control

40) Grinding shop and workshop for stamping threads upon screws

41) Workshop for partial assembly

42) Warehouse to store parts produced in factory

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- 43) Chief of registration of completed work
- 44) Prototype section - which by means of a mobile partition is separated from:
- 45) Carpentry assembly shop
- 46) Technological section
- 47) Operations and plans section. A wall of this section (northeastern) is made up of cabinets which contain all the files on the production of the factory. Above these cabinets which serve as a separating wall between the operations and plans section and the cloakroom, is a thick glass which reaches to the ceiling.
- 48) Section for construction of tools used in manufacturing
- 49) Preparatory warehouse of toolshop
- 50) Coordinating drill - an excellent machine - and for this reason placed in a separate section - obtained from Italy in 1950.
- 51) Office of the toolshop
- 52) Office of chief of toolshop
- 53) Auxiliary carpentry workshop for maintenance of factory buildings
- 54) Office of chief of electrical maintenance and building maintenance.
- 55) Hallway
- 56) Carpentry hand workshop
- 57) Warehouse containing standard tools
- 58) Warehouse containing factory tools (made at Ikarus)
- 59) Hardening (cooling) section for thermal processing of materials
- 60) Varnishing section - for varnishing of wooden parts
- 61) Sanding room - where metal parts are cleaned (only those made of iron and steel)
- 62) Compressor of from five to six atmospheres
- 63) Tank containing compressed air
- 64) Hallway. Above the hall which extends from No. 65 is an office of chief of personnel of the workshop
- 65) Workshop for landing gear

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- 66) Hangar for aircraft assembly (75 meters by 25 to 30 meters)
- 67) Locksmith workshop, which is separated by only one passage between the workbench from:
- 68) Tin-smith shop
- 69) On the first floor: work registration system; on the second floor: chiefs of the tin-smithy and the locksmith shops
- 70) Preparatory warehouse for locksmith shop
- 71) Electrical installations workshop in the "hangar" - for aircraft
- 72) Office of the chief for aircraft assembly
- 73) Offices for workers of the respective sections
- 74) Offices of production chief
- 75) Preparatory warehouse for tin-smith shop
- 76) Machine-carpentry shop
- 77) Office of the chief of machine-carpentry shop
- 78) Cutting and fashioning shop for wood parts, and for gluing the wing base
- 79) Offices of hand carpentry workshop
- 80) Workshop for metal propellers (metal propellers are not made here, but repairs are made to damaged propellers)
- 81) Auxiliary carpentry workshop
- 82) Supplies services
- 83) Warehouse for glues
- 84) Apprentice welding workshop - for training of student welders
- 85) Locksmith warehouse - for maintenance of buildings
- 86) Workshop for autogenous welding
- 87) Office of chief of welding shop
- 88) Electric welding
- 89) Workshop for testing and refinishing tanks of all kinds
- 90) Warehouse for sports (physical culture) requisitions
- 91) Fire station
- 92) Workshop for the initial shaping (carving) of wood

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- 93) Warehouse for inflammable material (paints and oils)
- 94) Workshop for the construction of water and oil coolers of "vehicles A" (or conveyors A), which is the factory term for tanks produced in Yugoslavia.
- 95) Workshop for repairs to standard tools.
- 96) Branch of Planning Section, for registry of time spent in production
- 97) Upholstery shop
- 98) Wooden shed containing old wooden tools
- 99) Fuel station (a small one) containing the second factory chimney which has a diameter of from 15 to 20 meters.
- 100) Parapet which before the war served to test the synchronization of the machine gun with the propeller (testing of the machine gun aim over (across) the propeller). It is now being used for smelting and filling the pipes (barrels) with calophonium (sic) so that they may be bent.
- 101) Shed which originally was to have served as a modern sand bin.
- 102) Painting and Upholstery section
- 103) Paint shop
- 104) Large hangar for storage of ready planes
- 105) Garage workshop
- 106) Garage
- 107) Coal unloading space. Coal is brought directly here from the main railroad track, and then distributed further.
- 108) Shed containing damaged machinery
- 109) Foundry
- 111) Office of the chief of the auxiliary workshops
- 110) Office of the foundry chief
- 112) Warehouse containing molds for airplane parts
- 113) Machine for molding parts under pressure. In May 1950 it was dispatched to an unknown destination from the Ikarus factory.
- 114) School for industrial apprentices
- 115) Warehouse containing workers clothing and laundry
- 116) Washroom
- 117) and 118) Two buildings of the workshop (school)

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- 119) Temporary warehouse containing raw material before it has been officially accepted and tested.
- 120) and 121) Projecting roof under which construction wood is stored.
- 122) Space (open) where rough construction wood is kept.
- 123) Space where metal scraps are kept. Here they are sorted and dispatched to the foundry.
- 124) Sports grounds
- 125) Barracks of the VTI (military technical industry), section A of which is the construction bureau of Major Beslin who draws plans of, and tests, warm water driven aircraft (sic).
- 126) Military guards section, with a strength equivalent to an infantry platoon.
- 127) Projecting roof for storage of bicycles
- 128) Tobacco shop
- 129) Building under construction - possibly completed by now. The purpose of it is not known.

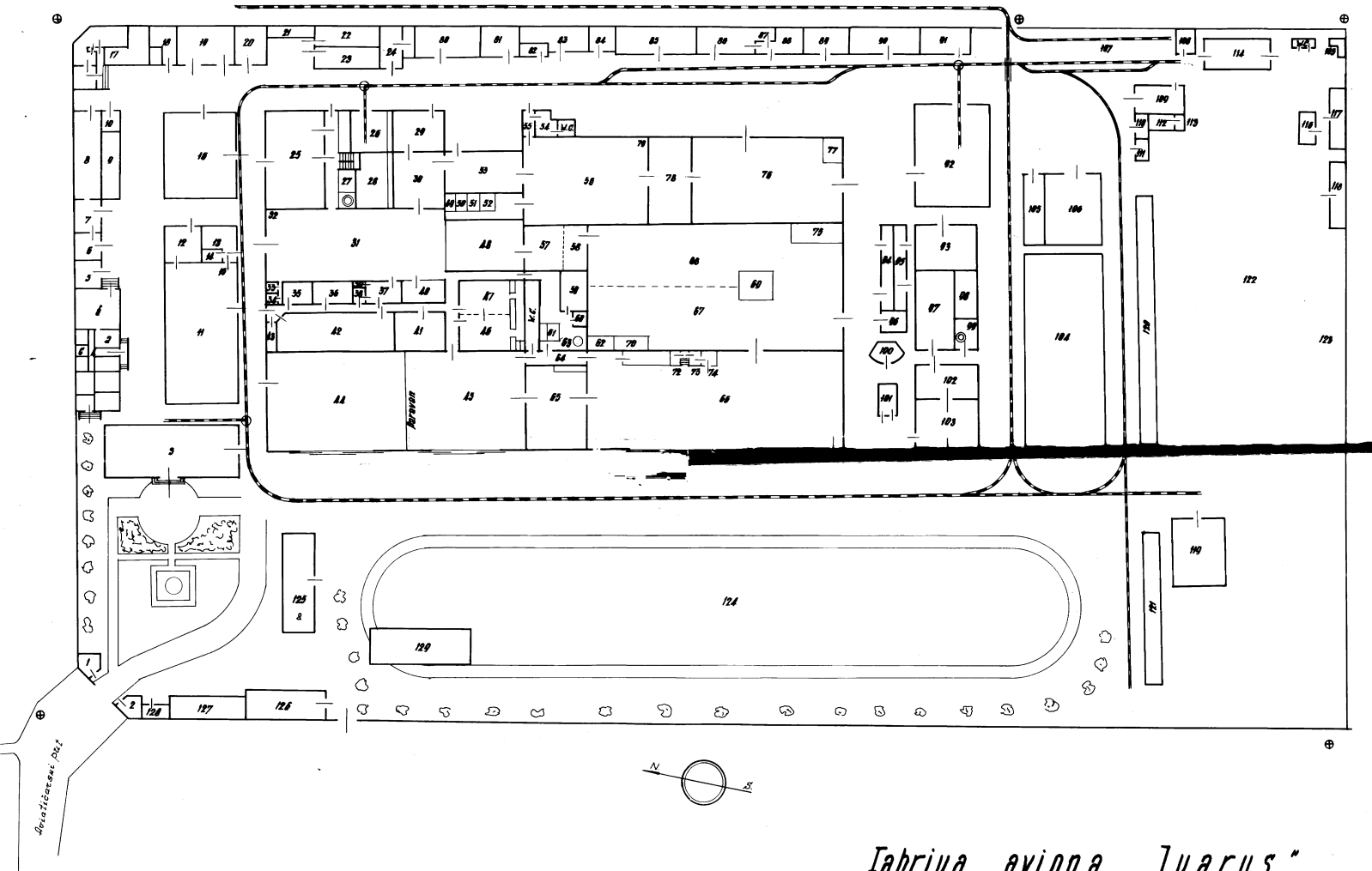
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Fabrika aviona „Ikarus“

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